

## CLAIMS

*Sub*  
*A12* 1. A hole forming tool which rotates around a rotational axis, comprising:  
one or more chip discharging grooves which are helically formed around the  
rotational axis in the exterior surface of said hole forming tool; and  
one or more cutting edges which are formed along ridge lines between inner surfaces  
of said chip discharging grooves, which are facing the rotating direction, and flank faces  
formed at an end of said hole forming tool,  
wherein a radial rake angle of said cutting edges is set to a negative value in the range  
of  $-5^{\circ}$  to  $-10^{\circ}$ , wherein a point angle thereof is in the range of  $125^{\circ}$  to  $135^{\circ}$  and wherein a  
groove width ratio thereof is in the range of 0.9 to 1.1.

2. A hole forming tool according to Claim 1, wherein a core diameter is in the range  
of  $0.38D$  to  $0.42D$ , in which  $D$  is a cutting edge diameter of said hole forming tool.

*Sub*  
*A13* 3. A hole forming tool according to Claim 1, wherein a helix angle of said chip  
discharging grooves is in the range of  $5^{\circ}$  to  $15^{\circ}$ .

4. A hole forming tool which rotates around a rotational axis, comprising:  
one or more chip discharging grooves which are helically formed around the  
rotational axis in the exterior surface of said hole forming tool; and  
one or more cutting edges which are formed along ridge lines between inner surfaces  
of said chip discharging grooves, which are facing the rotating direction, and flank faces  
formed at an end of said hole forming tool,  
wherein a radial rake angle of said one or more chip discharging cutting edges is set

to a negative value in the range of  $-5^{\circ}$  to  $-10^{\circ}$ , wherein a point angle thereof is in the range of  $125^{\circ}$  to  $135^{\circ}$ , and wherein a core diameter thereof is in the range of  $0.38D$  to  $0.42D$ , in which  $D$  is a cutting edge diameter of said hole forming tool.

5. A hole forming tool according to Claim 4, wherein a helix angle of said chip discharging grooves is in the range of  $5^{\circ}$  to  $15^{\circ}$ .

6. A hole forming tool which rotates around a rotational axis, comprising:  
one or more chip discharging grooves which are helically formed around the rotational axis in the exterior surface of said hole forming tool; and one or more cutting edges which are formed along ridge lines between inner surfaces of said chip discharging grooves, which are facing the rotating direction, and flank faces formed at an end of said hole forming tool,

wherein a radial rake angle of said one or more chip discharging cutting edges is set to a negative value in the range of  $-5^{\circ}$  to  $-10^{\circ}$ , wherein a point angle is in the range of  $125^{\circ}$  to  $135^{\circ}$ , and wherein a helix angle of said chip discharging grooves is in the range of  $5^{\circ}$  to  $15^{\circ}$ .

7. A hole forming tool which rotates around a rotational axis, comprising:  
one or more chip discharging grooves which are helically formed around the rotational axis in the exterior surface of said hole forming tool; and  
one or more cutting edges which are formed along ridge lines between inner surfaces of said chip discharging grooves, which are facing the rotating direction, and flank faces formed at an end of said hole forming tool,

wherein a radial rake angle of said one or more chip discharging cutting edges is set to a negative value in the I range of  $-5^{\circ}$  to  $-10^{\circ}$ , wherein a point angle thereof is in the range of  $125^{\circ}$  to  $135^{\circ}$ , and wherein at least parts thereof including said cutting edges comprise a cemented carbide and an average particle diameter of WC, comprised of said cemented carbide, is in the range of  $0.1$  to  $1.0\ \mu\text{m}$ .

8. A hole forming tool according to one of Claim 7, wherein a groove width ratio is in the range of  $0.9$  to  $1.1$ .

9. A hole forming tool according to one of Claim 7, wherein a core diameter is in the range of  $0.38D$  to  $0.42D$ , in which  $D$  is a cutting edge diameter of said hole forming tool.

10. A hole forming tool according to one of Claim 7, wherein a helix angle of said chip discharging grooves is in the range of  $5^{\circ}$  to  $15^{\circ}$ .

11. A hole forming tool which rotates around a rotational axis, comprising:  
one or more chip discharging grooves which are helically formed around the rotational axis in the exterior surface of said hole forming tool; and

one or more cutting edges which are formed along ridge lines between inner surfaces of said chip discharging grooves, which are facing the rotating direction, and flank faces formed at an end of said hole forming tool,

wherein a radial rake angle of said one or more chip discharging cutting edges is set to a negative value in the range of  $-5^{\circ}$  to  $-10^{\circ}$ , wherein a point angle thereof is in the range of  $125^{\circ}$  to  $135^{\circ}$ , and wherein at least a part thereof including said chip discharging grooves of

said hole forming tool is coated with a layer constructed of a hard material.

12. A hole forming tool according to one of Claim 11, wherein a groove width ratio is in the range of 0.9 to 1.1.

13. A hole forming tool according to one of Claim 11, wherein a core diameter is in the range of  $0.38D$  to  $0.42D$ , in which  $D$  is a cutting edge diameter of said hole forming tool.

14. A hole forming tool according to one of Claim 11, wherein a helix angle of said chip discharging grooves is in the range of  $5^\circ$  to  $15^\circ$ .

15. A hole forming tool according to Claim 1, wherein the main body of said hole forming tool is constructed of a cemented carbide which comprises  $10 \pm 2$  wt% Co,  $0.65 \pm 0.25$  wt% Cr, WC for the balance, and inevitable impurities.

16. A hole forming tool which rotates around a rotational axis, comprising:  
one or more chip discharging grooves which are helically formed around the rotational axis in the exterior surface of said hole forming tool; and  
one or more cutting edges which are formed along ridge lines between inner surfaces of said chip discharging grooves, which are facing the rotating direction, and flank faces formed at an end of said hole forming tool,

wherein a radial rake angle of said one or more chip discharging cutting edges is set to a negative value in the range of  $-5^\circ$  to  $-10^\circ$ , wherein a point angle is in the range of  $125^\circ$  to  $135^\circ$ , and wherein the main body of said hole forming tool is constructed of a cemented

carbide which comprises  $10 \pm 2$  wt% Co,  $0.65 \pm 0.25$  wt% Cr, WC for the balance, and inevitable impurities.

17. A method of constructing a hole forming tool which is rotatable about a rotational axis, comprising:

helically forming one or more chip discharging grooves around the rotational axis and in the exterior surface of said hole forming tool; and

forming one or more cutting edges along ridge lines between inner surfaces of said chip discharging grooves, which face the rotational direction, and flank faces formed at an end of said hole forming tool, and

setting a radial rake angle of said cutting edges to a negative value in the range of  $-5^\circ$  to  $-10^\circ$ , wherein a point angle is in the range of  $125^\circ$  to  $135^\circ$ , and wherein a groove width ratio is in a range of 0.9 to 1.1.

Add  
A16